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FIVE SPECIES OF *CALLISTOCY THERE* (OSTRACODA)
FROM THE INLAND SEA OF SETO¹⁾²⁾

With 5 Text-figures and 2 Plates

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瀬戸内海産カイミジンコ類, カリストキテレ科の5種

挿図5, 図版2

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This paper deals with one known and four new species of the genus *Callistocythere* RUGGIERI, 1953, from the Inland Sea of Seto. As I (1975) have reported *C. pumila* HANAI, *Callistocythere* species in the Inland Sea totalled to six. HANAI (1957) has divided his *Callistocythere* species into three groups. Of the six species, three belong to *C. littoralis* group, the others to *C. japonica* group.

I wish to express my thanks to Prof. A. INABA of Hiroshima University and Prof. T. HANAI of the University of Tokyo for their invaluable advice.

Family LEPTOCY THERIDAE HANAI, 1957

Genus *Callistocythere* RUGGIERI, 1953

Type-Species: *Cythere littoralis* MÜLLER, 1894

Description. Sexual dimorphism distinct; male more elongate than female; however, sculpture of the same in male and female.

Carapace thick in general, relatively small, compressed laterally. Surface ornamented with pits and undulate ridges in general. Colour brownish ochre, when alive.

Both valves nearly symmetrical; posterior cardinal angle less prominent in right valve than in the left. Valve elongate sub-quadrangular in lateral outline, with distinct posterior cardinal angle in most species; greatest height at anterior half.

1) Recent Marine Ostracoda in the Inland Sea—XII.

2) Contribution from the Mukaishima Marine Biological Station, No. 169.

Dorsal margin slightly convex, descending backward. Anterior margin more broadly rounded than the posterior. Ventral margin sinuated at the middle.

Selvage peripheral. Flange often coincident with selvage in lateral view. List and striae almost parallel to selvage. Infold wide in anterior and postero-ventral margins, moderate in width in the other margins. Inner margin smooth. Line of concrescence greatly irregular, coincident with inner margin in most parts. Narrow vestibule present anteriorly. Radial pore canals moderate in number, anteriorly and posteriorly their inner ducts very rough and fused to one another, to be poly-furcated and lobated. Snap-knob existing at mid-ventral area of right valve, snap-pit in the left. Adductor muscle scars four in vertical row, with one or two frontal scars; occasionally these scars obscure.

Hingement modified entomodont. Right valve: Composed of anterior tooth, finely pitted intermediate shelf and sub-quadrate posterior tooth. Left valve: Of anterior socket, crenulated intermediate ridge, posterior socket and containant just above the ridge, and also with tooth-like projections of anti-slip nature in front of anterior socket and behind posterior socket.

Antennula: Of five podomeres. First podomere without seta. Second podomere with fine seta postero-distally. Third podomere with claw or stout seta antero-distally. Fourth podomere made by fusing of two ones, equipped with two claws and five setae: claw and stout seta mid-dorsally, seta at the centre, claw and two (stout and slender) setae antero-distally, seta postero-distally. Fifth podomere slender, provided with claw, sense club, two (fine anterior and long posterior) setae distally. Each claw possessing a long hair near tip.

Antenna: Of four podomeres. First podomere without seta. Second podomere short, square, with seta postero-distally, fine hairs antero-proximally. Third podomere oblong, adorned with two setae antero-medially, two setae and sense club postero-distally, stout plumose seta postero-distally. Fourth podomere very small, armed with two strong claws of sub-equal length. Spinneret seta hardly reaching to tip of terminal claw, two-segmented at distal third, where it forms knee; occasionally proximal segment weakly subdivided into two.

Mandible: Coxa with weakly developed teeth. Palp of four podomeres. First podomere of palp with two setae postero-distally, and with exopodite which is composed of long plumose seta and small hook-shaped process. Second podomere with two long plumose and two short setae postero-distally. Third podomere sub-pentagonal, with three (one long and two short) setae antero-medially, seta antero-distally, two (short fine and long stout) setae postero-distally. Fourth podomere very small, with four setae distally.

Maxillula: Branchial plate usually with 16 feather-like setae. Palp of two podomeres; proximal one with three setae antero-distally, one seta postero-distally;

distal one with claw-like setae distally. Three masticatory lobes possessing several setae distally. Large stout seta situated near inner masticatory lobe.

Walking legs: Of four podomeres. Setal formula for (antero-medial, antero-distal, posterior) areas of first podomeres (protopodites) of maxilla and thoracopoda 1 & 2: (1+1, 2, 1), (1+1, 1, 1), (1+1, 1, 1). Each second podomere with seta at antero-distal end. Claws relatively strong, curved forward.

Copulatory organ: Composed of basal part and two or three processes. Basal part quadrant-shaped, adorned with long spiral copulatory tube. Anterior process triangular; posterior process flame-shaped; middle process, if present, of various shapes.

Remarks. The callistocythere species in the Inland Sea belong to the following two groups: *Callistocythere littoralis* and *C. japonica* groups. The former possesses the thick and heavily sculptured carapace and the intermediate elements of the hingement that have two enlarged anterior terminal teeth in the left valve or two large sockets in the right valve. The latter possesses the somewhat thin and weakly sculptured or smooth carapace and the intermediate elements of the hinge that have one enlarged anterior terminal tooth or socket.

Ecologically, most species of this genus were collected from sandy mud to sand; only one species was exclusively discovered at rocky shores where algae grew thick.

Key to species of the Inland Sea

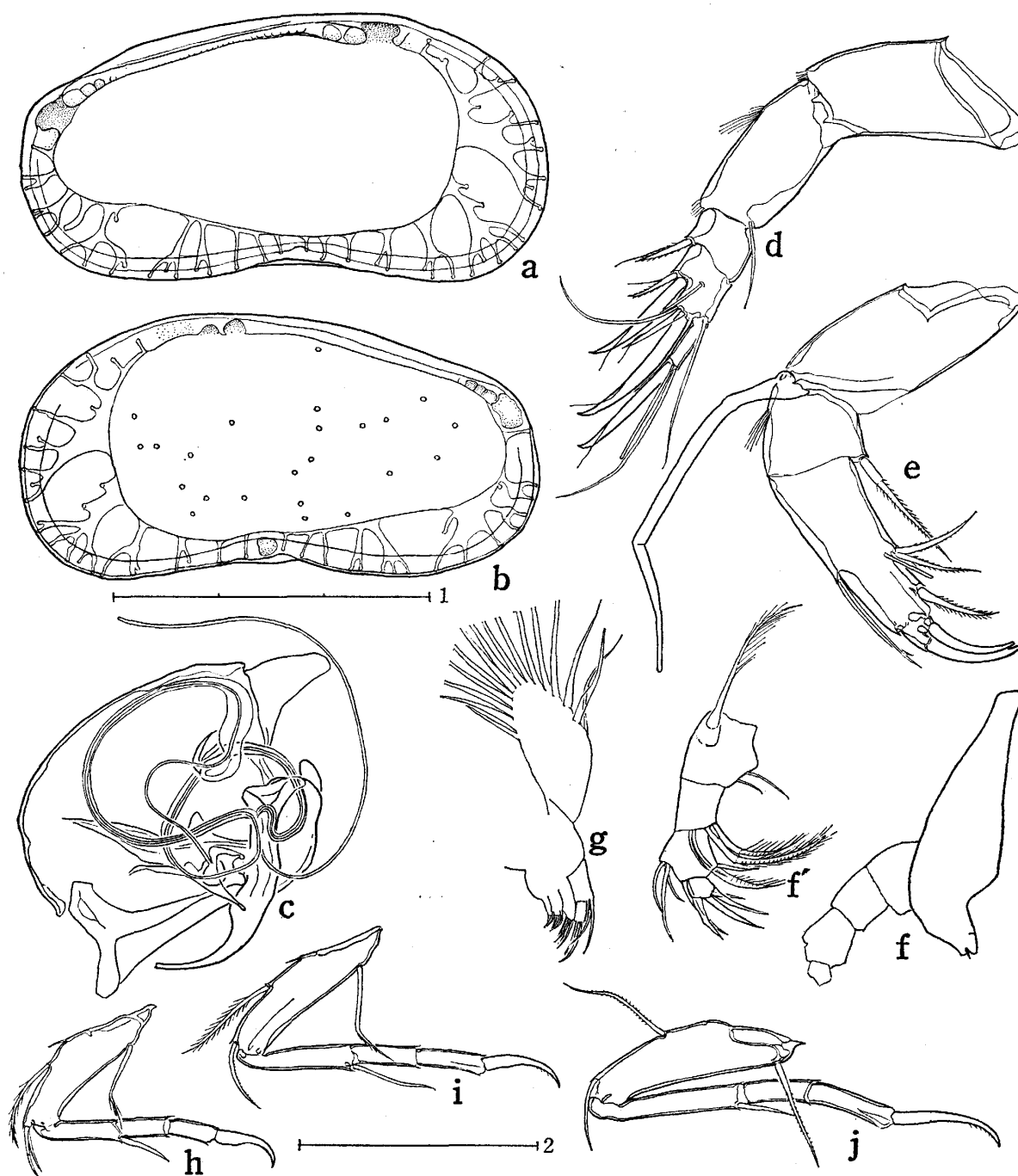
- A. *Callistocythere littoralis* group.
 - B. Surface densely pitted. *C. setouchiensis*.
 - B. Surface coarsely pitted.
 - C. Valve without postero-ventral angle. *C. hosonosuensis*.
 - C. Valve with postero-ventral angle. *C. angulata*.
- A. *Callistocythere japonica* group.
 - B. Surface weakly sculptured.
 - C. Surface coarsely pitted. *C. japonica uranipponica*.
 - C. Surface densely pitted. *C. pumila*.
 - B. Surface smooth. *C. laevis*.

Callistocythere littoralis group

Callistocythere setouchiensis sp. nov.

(Fig. 1; Pl. 1 a-d)

Description. Carapace compressed laterally. Surface pitted densely; pits in anterior half slightly smaller than those in the posterior. Anterior marginal ridge weak. Second anterior marginal ridge prominent, from eye spot to antero-medial area. Posterior marginal ridge weak. Second posterior marginal ridge noticeable, from cardinal angle to postero-medial area. Ventral marginal ridge distinct. Ridge



Text-fig. 1. *Callistocythere setouchiensis*. a, b, d-g, f', MO-568, ♀; c, h-j, MO-569, ♂. a, left valve; b, right valve; c, copulatory organ; d, antennula; e, antenna; f, f', mandible; g, maxillula; h, maxilla; i, thoracopoda 1; j, thoracopoda 2. Scale: 1(=0.3 mm) for a, b; 2(=0.1 mm) for c-j.

from mid-dorsal to middle area relatively prominent.

Left valve oblong sub-reniform; slightly tapered backward; greatest height at anterior two-fifths in female, one-third in male. Dorsal margin gently arched, des-

ending backward; posterior cardinal angle remarkable. Anterior margin broadly and obliquely rounded. Posterior margin sub-truncate above, round below. Ventral margin sinuated in front of the middle.

Marginal area of *Callistocythere* type. Selvage, flange, two striae existent. Infold relatively wide anteriorly and postero-ventrally. Inner margin smooth. Vestibule very narrow. Radial pore canals poly-furcated anteriorly and posteriorly, owing to complicate fusing of their inner ducts. Hingement of *Callistocythere littoralis* type: Prominent teeth or sockets at anterior termination of intermediate element two in number. Adductor muscle scars obscure.

Antennula: Length ratio of distal four podomeres: 10:5:4:5, along posterior margins. Antenna: Distal three podomeres and claw having length ratio 12:16+9:4:12, along anterior margins. Spinneret seta relatively short, its tip nearly reaching to base of claw, two-segmented at length ratio of 20:11.

Mandible and Maxillula: Of *Callistocythere* type.

Walking legs: Length ratio of distal three podomeres and claws of maxilla and thoracopoda 1 & 2: (23:12:12:20): (29:17:17:24): (38:19:19:34), along posterior margins. Thoracopoda 1: Seta of second podomere slender in male, short and stout in female.

Copulatory organ: Basal part sub-quadrate; anterior process of right-angled triangular lamella, with truncate anterior angle; posterior process of curved flame-shaped tube with slender neck.

(Other characters: Cf. generic description.)

Material. MO-569, ♂ (holotype), LV (49-26), RV (49-25); MO-568, ♀ (allotype), LV (50-27), RV (49-27); Mukai-shima Island, 11-VII-1976. MO-807, ♀ (paratype), LV (48-27), RV (48-26), Shodo-shima Island.

Occurrence. Common in intertidal zones of rocky shores in the Inland Sea, where algae grow thick. Rather abundant.

Remarks. This new species resembles *C. reticulata* HANAI, 1957, but differs from it in the detailed outline of valves. This species is characterized by its habitat.

Callistocythere hosonosuensis sp. nov.

(Fig. 2; Pl. 1 e-h)

Description. Carapace compressed laterally. Surface sculptured with relatively large pits, which are often subdivided into two to several ones; the pit just behind adductor muscle scars consisting of five small pits. Ridges thick in general. Second posterior marginal ridge strong, from dorso-posterior, through mid-posterior, down to postero-ventral area; no sharpened projection at postero-ventral margin. Ventral marginal ridge strong, slightly ascending backward.

Left valve sub-quadrangular in lateral outline, slightly tapered backward; greatest height at anterior third. Dorsal margin slightly convex, descending backward; posterior cardinal angle prominent. Anterior margin rounded obliquely and broadly, with about seven small projections at termination of radial pore canals along lower half. Posterior margin truncate above, round below, with several small projections. Ventral margin slightly sinuated at the middle.

Marginal area of *Callistocythere* type. Hingement of *C. littoralis* type; prominent pits of right valve or corresponding teeth of left valve at anterior termination of intermediate element two in number; the third slightly larger than the others, which are relatively distinct throughout the shelf or the ridge.

Antennula: Distal four podomeres having length ratio 27:15:15:17. Antenna: Length ratio of distal three podomeres and claw: 10:16+9:4:12. Spinneret seta relatively short, segmented at length ratio of roughly 2:1; proximal segment having signs of one more segmentation at distal three-eighths.

Mandible and Maxillula: Of *Callistocythere* type.

Walking legs: Length ratio of distal three podomeres and claws of maxilla and thoracopoda 1 & 2: (25:15:15:23):(33:18:18:29):(44:20:21:35). The length ratios equal in both males and females.

Copulatory organ: Basal part sub-pentagonal; anterior process of right-angled triangular lamella with prominent concave hypotenuse; middle process of tongue-like lamella; posterior process of curved bottle-shaped tube with broadened end.

(Other characters: Cf. generic description.)

Material. MO-827, ♂ (holotype), LV (52-26), RV (52-27); MO-832, ♀ (allotype), LV (51-27), RV (50-27); MO-831, ♂ (paratype), LV (—), RV (52-27); Hosonosu Sand Bank, 1-VI-1976.

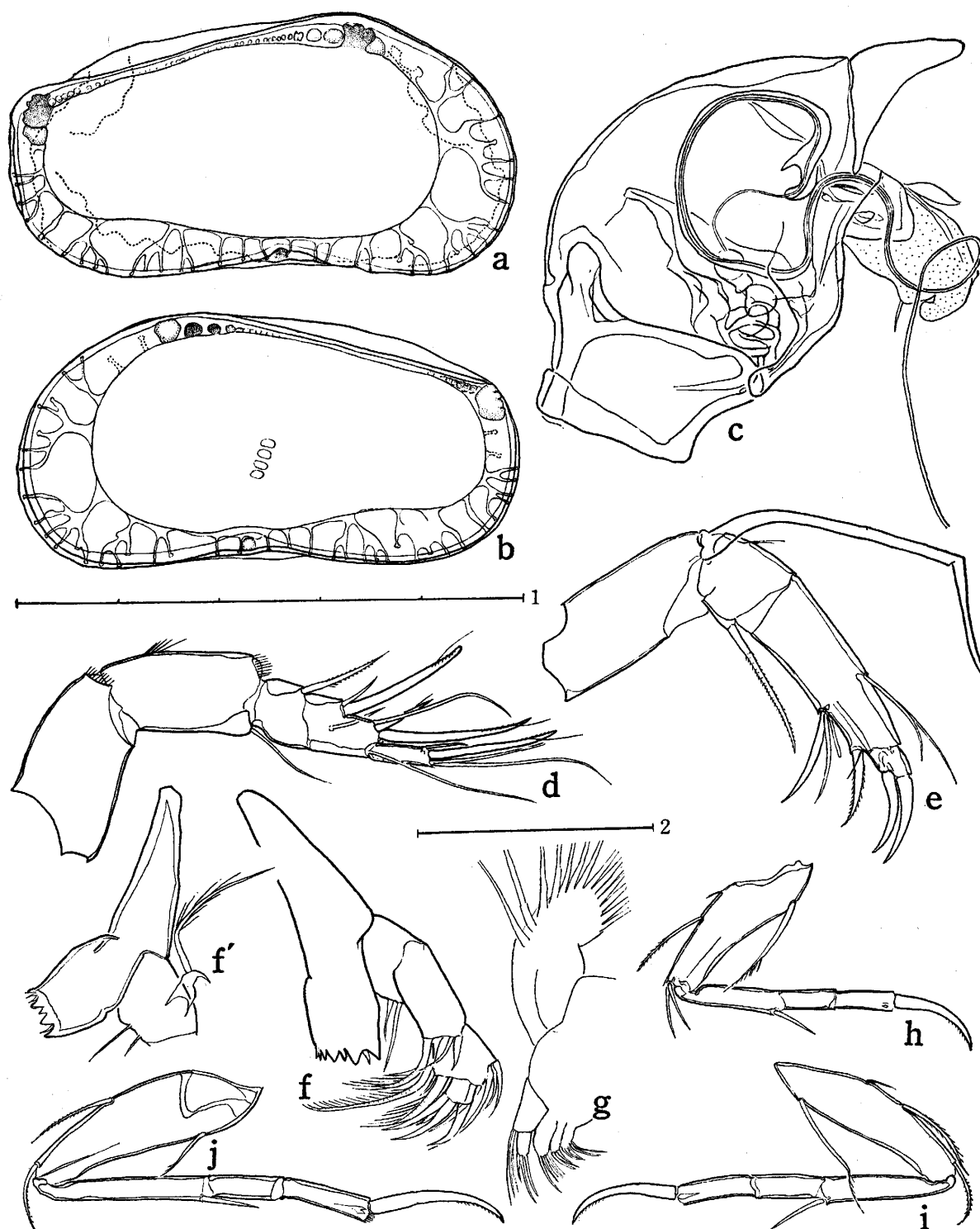
Occurrence. At Hosonosu Sand Bank, where it is rather abundant.

Remarks. This new species is similar to *C. hayamensis* HANAI, 1957, but different from it in the outline. This species also greatly resembles *C. angulata* in this paper, but differs from it in the sculpture just behind adductor muscle scars and the absence of the postero-ventral projection.

Callistocythere angulata sp. nov.

(Fig. 3; Pl. 1 i-l)

Description. Compressed laterally. Surface covered with relatively large pits, which are often subdivided into two to several ones; just behind adductor muscle scars, four small pits arranged like rhomb and forming a large pit. Second posterior marginal ridge angulated at upper third, at lower third, and at postero-ventral margin; the latest being most prominent.



Text-fig. 2. *Callistocythere hosonosuensis*. a, b, d-j, MO-832, ♀; c, MO-836, ♂. a, left valve; b, right valve; c, copulatory organ; d, antennula; e, antenna; f, f', mandible; g, maxillula; h, maxilla; i, thoracopoda 1; j, thoracopoda 2. Scale: 1 (=0.5 mm) for a, b; 2 (=0.1 mm) for c-j.

Left valve sub-quadrangular; greatest height at anterior third. Dorsal margin slightly arched; somewhat angulated at posterior third, in which strong radiate ridge terminates; posterior cardinal angle distinct. Anterior margin broadly and obliquely rounded, with about seven small projections at terminations of radial pore canals along lower half. Posterior margin truncate above, round below, with about four weak projections. Ventral margin very slightly concave at the middle.

Marginal area of *Callistocythere* type. Radial pore canals poly-furcated anteriorly and posteriorly. Hingement of *C. littoralis* type; two anterior terminal teeth of left valve and two corresponding sockets of the right distinctly enlarged.

Antennula: Length ratio of distal four podomeres: 32:17:17:20. Antenna: Length ratio of distal three podomeres and claw: 22:37+24:10:32. Spinneret seta somewhat slender; two-segmented at length ratio of 7:3.

Mandible and Maxillula: Of *Callistocythere* type.

Walking legs: Length ratio of distal three podomeres and claws: (30:18:17:30): (40:23:22:36):(58:26:29:48). Claws somewhat slender.

Copulatory organ: Basal part elliptical. Anterior process of right-angled triangular lamella, with small spine at anterior angle; posterior process of curved flame-shaped tube, folded at the middle.

(Other characters: Cf. generic description.)

Material. MO-821, ♂ (holotype), LV (62-35), RV (62-34); MO-824, ♀ (allotype), LV (58-32), RV (58-31); MO-834, ♀ (paratype), LV (58-32), RV (58-32); Hosonosu Sand Bank, 1-VI-1976.

Occurrence. At Hosonosu Sand Bank, where it is not abundant.

Remarks. This species greatly resembles *C. hosonosuensis* in this paper but differs from it in the sculpture of the valves and the presence of the postero-ventral projection.

Callistocythere japonica group

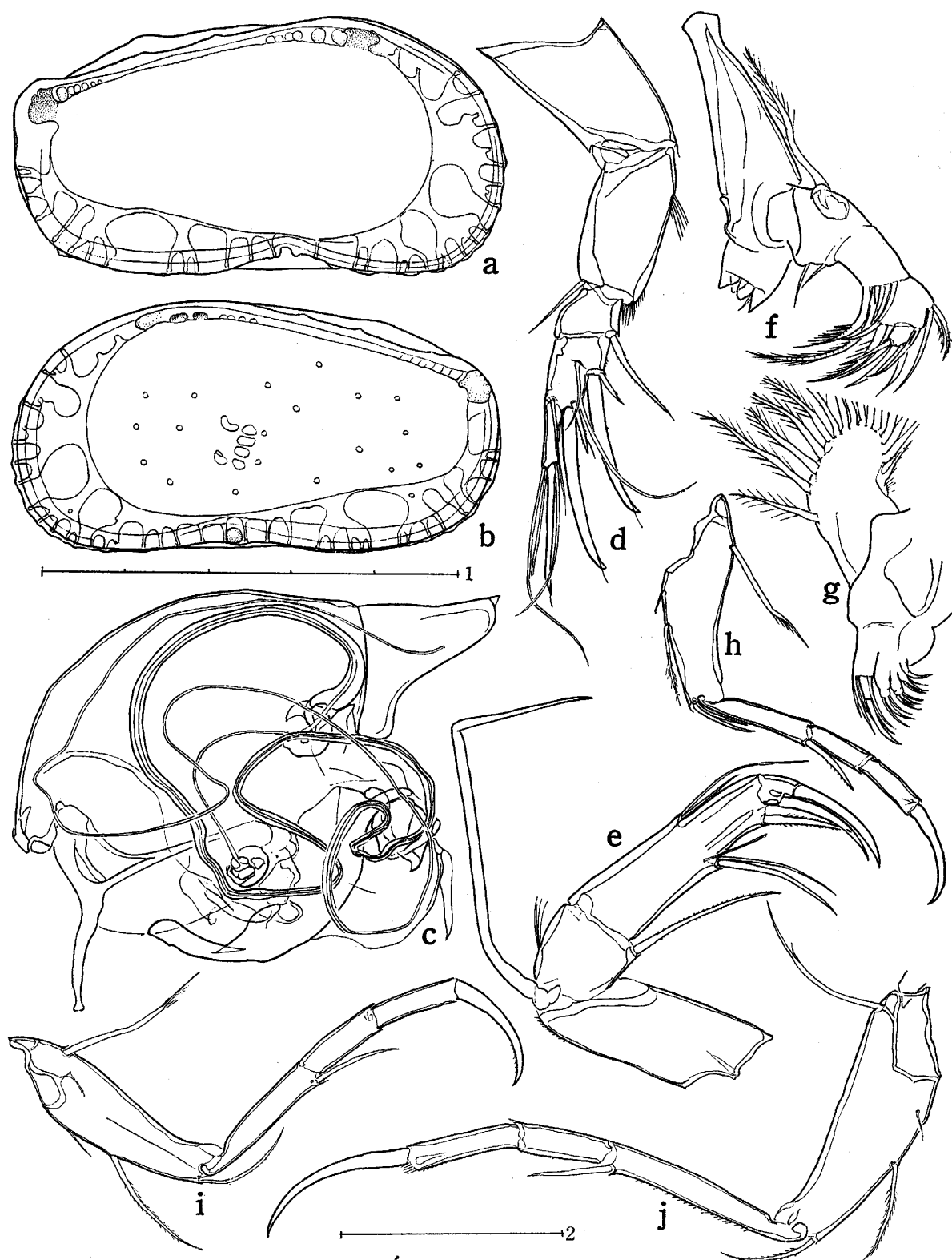
Callistocythere japonica uranipponica HANAI, 1957

(Fig. 4; Pl. 2 a-d)

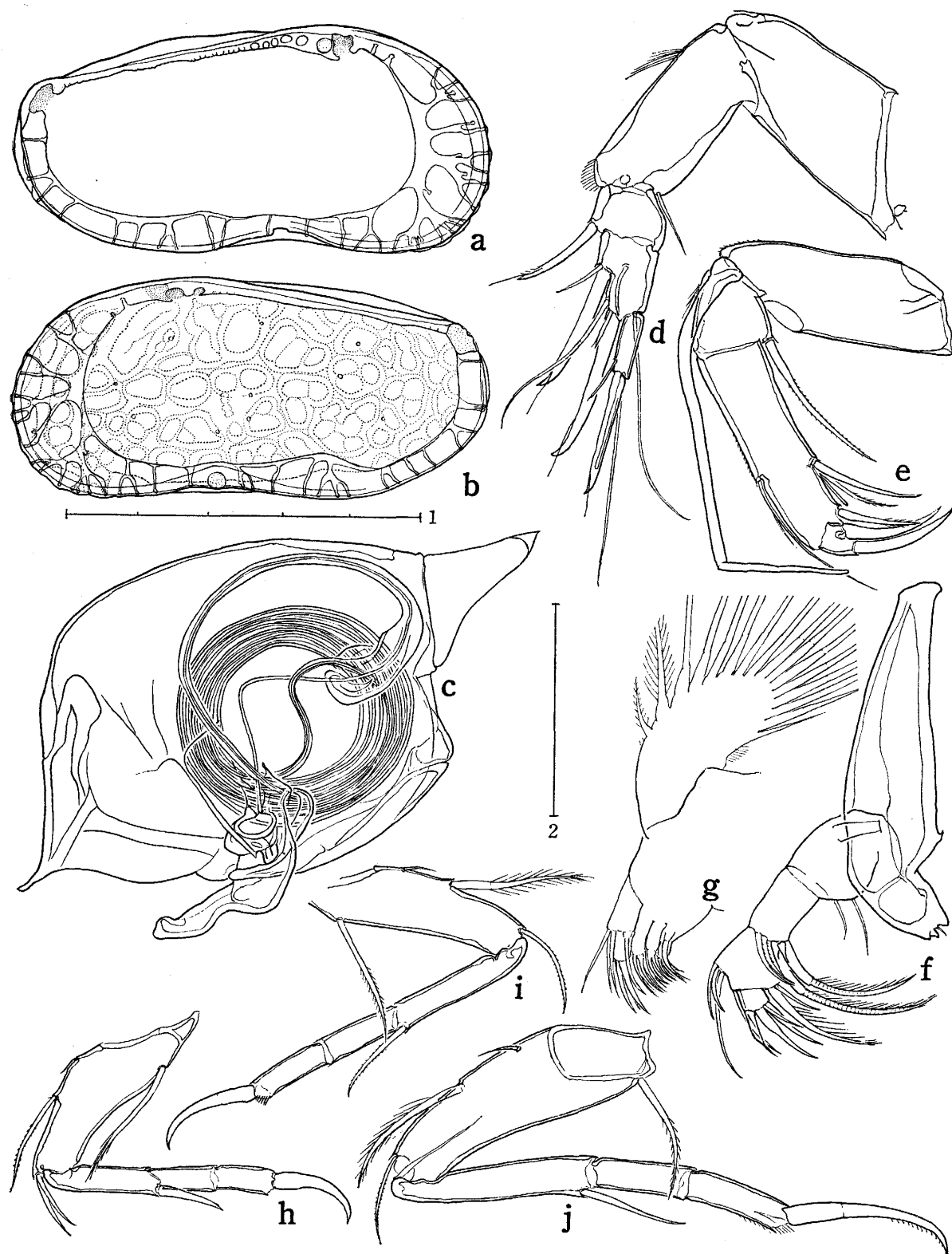
Callistocythere japonica uranipponica HANAI, 1957, p. 459, Pl. 9, fig. 3 a-c; HANAI *et al.*, 1977, p. 33.

Description. Carapace compressed. Surface sculptured by low undulating ridges which have a tendency to run obliquely forward; pits relatively large, usually subdivided into some ones.

Left valve elongate sub-reniform in lateral view; greatest height at three-eighths length from anterior end. Dorsal margin almost straight; the outline slightly arched; posterior cardinal angle distinct. Anterior margin rounded obliquely, with about



Text-fig. 3. *Callistocythere angulata*. a, b, MO-834, ♀; c-j, MO-823, ♂. a, left valve; b, right valve; c, copulatory organ; d, antennula; e, antenna; f, mandible; g, maxillula; h, maxilla; i, thoracopoda 1; j, thoracopoda 2. Scale: 1 (=0.5 mm) for a, b; 2 (=0.1 mm) for c-j.



Text-fig. 4. *Callistocythere japonica uranipponica*. MO-719, ♂. a, left valve; b, right valve; c, copulatory organ; d, antennula; e, antenna; f, mandible; g, maxillula; h, maxilla; i, thoracopoda 1; j, thoracopoda 2. Scale: 1 (=0.3 mm) for a, b; 2 (=0.1 mm) for c-j.

seven small round projections. Posterior margin truncate above, round below. Ventral margin slightly concave in front of the middle, sub-parallel to the dorsal.

Marginal area of *Callistocythere* type. Fused zone irregular anteriorly; therefore, radial pore canals bi- or poly-furcated anteriorly; unbranched or bi-furcated ventrally and posteriorly. Posterior apparent opening remarkably narrow, by which this is discriminated from *C. japonica japonica* HANAI, 1957. Hingement of *Callistocythere japonica* type.

Antennula: Length ratio of distal four podomeres: 35:17:17:19; seta of third podomere claw-like. Antenna: Distal three podomeres and claw having length ratio 25:40+23:10:31. Spinneret seta two-segmented at length ratio of 8:3; distal segment narrow along distal half.

Mandible and Maxillula: Of *Callistocythere* type.

Walking legs: Length ratio of second to fourth podomeres and claws of maxilla and thoracopoda 1 & 2: (28:18:15:28):(39:24:19:31):(56:27:27:48).

Copulatory organ: Basal part sub-square; anterior process right-angled triangular lamella with pointed anterior angle; posterior process relatively small lamella of indefinite form.

(Other characters: Cf. generic description.)

Material. MO-719, ♂, LV (67-33), RV (68-32); MO-825, ♀, LV (67-33), RV (67-33); Hosonosu Sand Bank, 1-VI-1977.

Occurrence. Very rare. In or on muddy sand, where eel grass grew.

Remarks. This subspecies has the same sculpture as in *C. japonica japonica*, but has not the distinct posterior apparent opening. HANAI (1957) has advisably written, "*Callistocythere japonica* s. str. appears to be restricted to the Pacific coast of Japan."

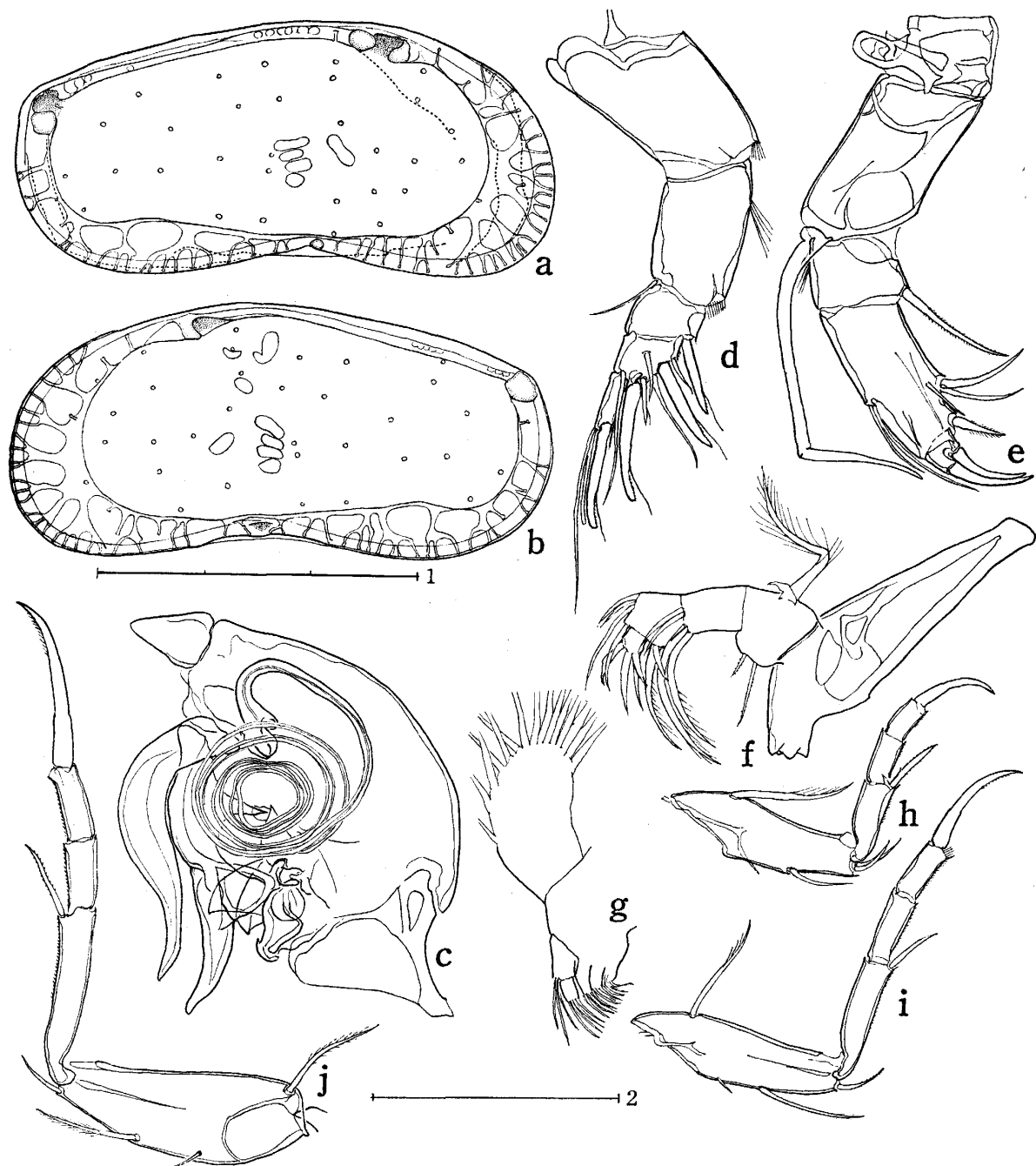
Callistocythere laevis sp. nov.

(Fig. 5; Pl. 2 e-h)

Description. Carapace somewhat thin, slightly compressed. Surface smooth and polished.

Left valve sub-quadrangular in lateral outline; greatest height at anterior three-sevenths in female, at one-third in male. Dorsal margin slightly arched; posterior cardinal angle present. Anterior margin obliquely rounded. Posterior margin rounded in general, somewhat truncate above. Ventral margin distinctly sinuated, sub-parallel to the dorsal.

Marginal area of *Callistocythere* type. Infold relatively wide anteriorly and postero-ventrally. Inner margin smooth in general, slightly sinuated postero-ventrally. Radial pore canals mostly poly-furcated. Vestibule present only anteriorly. Hingement of *Callistocythere japonica* type. Right valve: Composed of anterior and



Text-fig. 5. *Callistocythere laevis*. a, b, d-f, h-j, MO-829, ♀; c, g, MO-828, ♂. a, left valve; b, right valve; c, copulatory organ; d, antennula; e, antenna; f, mandible; g, maxillula; h, maxilla; i, thoracopoda 1; j, thoracopoda 2. Scale: 1 (=0.3 mm) for a, b; 2 (=0.1 mm) for d-j.

posterior teeth and intermediate shelf, which is finely pitted throughout and has one socket at anterior termination. Left valve: Of anterior and posterior sockets and intermediate ridge, which is crenulated throughout and has one prominent tooth

anteriorly. Adductor muscle scars four in vertical row, with additional scar in front of them. Snap-knob existing in right valve, snap-pit in the left.

Antennula: Length ratio of distal four podomeres: 16:10:15:24. Third podomere with claw antero-distally. Antenna: Distal three podomeres and claw having length ratio 18:25+17:7:18; spinneret seta two-segmented at length ratio of 2:1.

Mandible and Maxillula: Of *Callistocythere* type.

Walking legs: Length ratio of distal three podomeres and claws: (20:14:9:20): (32:18:14:28):(43:18:18:45).

Copulatory organ: Basal part elliptical. Processes three in number. Anterior process of small triangular lamella that has not right angle; middle and posterior processes of flame-shaped lamellae curved backward; middle one larger. Copulatory tube spiral, coiling several times.

(Other characters: Cf. generic description.)

Material. MO-639, ♂ (holotype), LV (50-22), RV (49-21), Mukai-shima Island 6-V-1977. MO-829, ♀ (allotype), LV (51-25), RV (51-25); MO-828, ♂ (paratype), LV (49-22), RV (49-21); Hosonosu Sand Bank, 1-VI-1977.

Occurrence. Not abundant. In intertidal zones of Hosonosu Sand Bank and near the Mukaishima Marine Biological Station.

Remarks. This new species has some characters of both *Callistocythere* and *Leptocythere*: namely, it resembles the species of *Leptocythere* in possessing the elongate valve with the smooth surface, but it owns the characters of *Callistocythere*, in which most radial pore canals are poly-furcated.

References

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- OKUBO, I. 1975. *Callistocythere pumila* HANAI, and *Leguminocythereis bisanensis* sp. nov., in the Inland Sea, Japan (Ostracoda). *Proc. Jap. Soc. Syst. Zool.*, (11): 23-31.

Explanation of Plates

- Plate 1. *Callistocythere* spp. (*C. littoralis* group). a-d, *C. setouchiensis*. a, b, MO-807, ♀; c, d, MO-671, ♂. e-h, *C. hosonosuensis*. e, f, MO-832, ♀; g, h, MO-827, ♂. i-l, *C. angulata*. i, j, MO-834, ♀; k, l, MO-823, ♂. a, c, e, g, i, k, left valve; b, d, f, h, j, l, right valve. (a, b, e, f, i, j, focussed on lateral wall; c, d, g, h, k, l, on margins). Scale (0.5 mm): 1 for a-d; 2 for e-h; 3 for i-l.
- Plate 2. *Callistocythere* spp. (*C. japonica* group). a-d, *C. japonica uranipponica* MO-719, ♂. e-h, *C. laevis*. e, f, MO-829, ♀; g, h, MO-828, ♂. a, c, e, g, left valve; b, d, f, h, right valve. (a, b, e-h, focussed on margins; c, d, on lateral wall). Scale (0.5 mm): 1 for a-d; 2 for e-h.

